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IS 8135 (1996): Fast extrusion furnace (FEF) carbon black [PCD 13: Rubber and Rubber Products]

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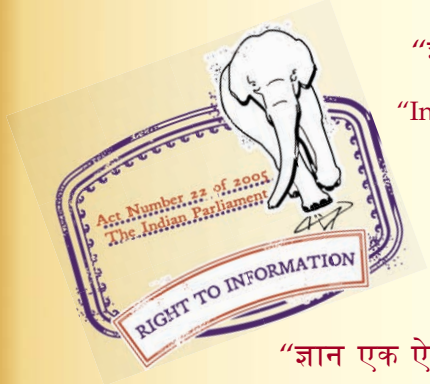



"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 8135 : 1996
(Reaffirmed - 2012)

भारतीय मानक

# शीघ्र विहिर्बेघन भट्टी (शी. वि. भ.) कार्बन कालिस — विशिष्टि

( दूसरा पुनरीक्षण )

*Indian Standard*

# FAST EXTRUSION FURNACE (FEF) CARBON BLACK — SPECIFICATION

*( Second Revision )*

ICS 83.040.20



BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*February* 1996 Price Group 2

Rubber Products Sectional Committee, PCD 13

## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Rubber Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was first published in 1976 and revised in 1986. In this second revision, Industry Reference Black (IRB) No 6 has been included as reference black instead of IRB No. 5 for measuring physical properties of the vulcanizate

This standard contains clauses **3.2** and **3.4** which call for agreement between the purchaser and the supplier

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# AMENDMENT NO. 1 MARCH 2003
# TO
# IS 8135 : 1996 FAST EXTRUSION FURNACE (FEF) CARBON BLACK—SPECIFICATION

*( Second Revision )*

( *Title* ) — Substitute '[(FEF)N550] *for* (FEF)

( *Page* 2 *clause* **3.4**, *line* 4 ) — Substitute 'No. 7' *for* 'No. 6'

( *Page* 2 *clause* **4.1**, *line* 4 ) — Substitute 'slight' *for* 'sight'

( *Page* 2, *clause* **A-2** ) Substitute 'IS 3399 : 1993' *for* 'IS 3399 : 1973'

( *Page* 2, *clause* **A-2** )— Substitute 'Carbon black [(FEF)N550]' *for* Carbon black (FEF)

( *Page* 3, *clause* **A-4.1**, *line* 1 ) — Substitute '30 minutes' *for* '15 to 30 minutes'

( *Page* 3 *clause* **A-6** *line* 3 ) —Substitute ' IRB No. 7' *for* 'IRB No. 6'

( *Page* 3, *Table* 2 ) — Substitute the following for the existing

**Table 2 Difference in Physical Properties of Vulcanisates Containing FEF Carbon Black as Compared to IRB No. 7**

| Cure Conditions | Tensile Strength, *Min*, MPa* | 300 Percent Modulus MPa* |
|---|---|---|
| (1) | (2) | (3) |
| 30 min at 145°C | - 5.71 | - 2.95 to + 0.05 |

*1 MPa = approximately 10.2 kgf/cm$^2$

( PCD 13 )

Reprography Unit BIS New Delhi India

*Indian Standard*

# FAST EXTRUSION FURNACE (FEF) CARBON BLACK — SPECIFICATION

*( Second Revision )*

## 1 SCOPE

This standard prescribes the requirements, methods of sampling and test for fast extrusion furnace (FEF) carbon black for use in rubber industry

## 2 NORMATIVE REFERENCES

The following Indian Standards contain provision which through reference in this text, constitute provisions of this standards At the time of publication the edition indicated were valid All standards are subject to revision, and parties to agreements based on the standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below

| *IS No* | *Title* |
|---|---|
| 1070 1992 | Reagent grade water — Specification *(third revision)* |
| 1675 1971 | Stearic acid, technical *(first revision)* (Amendment 1) |
| 3399 1993 | Zinc oxide for rubber industry *(second revision)* |
| 3400 (Part 1) 1987 | Methods of test for vulcanized rubber Part 1 Tensile stress-strain properties *(second revision)* |
| 4588 1986 | Rubber, raw, natural *(third revision)* |
| 7498 1985 | Methods of sampling and test for carbon black *(first revision)* |
| 8483 1989 | Diabenzothiazyl disulphide *(first revision)* |
| 8851 1994 | Sulphur for rubber industry *(first revision)* |

## 3 REQUIREMENTS

3 1 The material shall be free from foreign matter and any visible impurities

### 3 2 Pelletization

The material shall be delivered in the pelletized form Pellet hardness shall be controlled to such a degree that satisfactory dispersion is obtained on its being compounded in standard mixing equipment as desired by the purchaser

3.3 The material shall comply with the requirements given in Table 1

**Table 1 Requirements for Fast Extrusion Furnace (FEF) Carbon Black**
*(Clauses 3 3 and 6 1)*

| Sl No | Characteristic | Requirement | Methods of Test in IS 7498 1985 (Ref to Cl No ) |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| i) | Iodine adsorption mg of iodine (as I)/g of carbon black | 38 to 48 | 5 |
| ii) | Dibutyl phthalate (DBP) absorption ml/100 g | 115 to 125 | 6 |
| iii) | Pour density g/l | 320 to 380 | 7 |
| iv) | Sieve residue percent by mass *Max* | | 8 |
| | a) On 45 micron IS Sieve | 0 100 0 | |
| | b) On 500 micron IS Sieve | 0 001 0 | |
| v) | Loss on heating percent by mass *Max* | 1 5 | 9 |
| vi) | Ash content percent by mass *Max* | 0 75 | 10 |
| vii) | Fines content, percent by mass, *Max* | 15 0 | 13 |
| viii) | Toluene discoloration percent transmission *Min* | 80 | 16 |

### 3.4 Compounding

If desired by the purchaser, the material may be compounded in natural rubber test recipe and the properties of carbon black assessed relative to IRB No. 6. Recommended method for compounding and the test recipe is given in Annex A.

## 4 PACKING AND MARKING

### 4.1 Packing

The material shall be supplied in paper bags. The net mass of each bag shall be 25.0 ± 0.5 kg. The bags shall be shaped to facilitate stacking of pellets by sight ironing.

### 4.2 Marking

4.2.1 Each package shall be clearly and indelibly marked with the following information:

a) Name of material,
b) Name of manufacturer,
c) Net mass of the material,
d) Shall have blue colour straight strips as a colour code identification,
e) Month and year of manufacture, and
f) Batch or lot number.

4.2.2 *BIS Certification Marking*

The package may also be marked with the Standard Mark.

4.2.3 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

## 5 SAMPLING

5.1 The sampling of carbon black shall be done in accordance with 2 of IS 7498 : 1985.

### 5.2 Number of Tests

All the characteristics of FEF carbon black given in Table 1 shall be tested on individual samples.

### 5.3 Criteria for Conformity

The lot shall be declared as conforming to the requirements of the specification if all the test results on each of the individual samples shall satisfy the corresponding requirements.

## 6 TEST METHODS

6.1 Test shall be conducted according to the method prescribed in Annex A and in col 4 of Table 1.

### 6.2 Quality of Reagent

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070 : 1992) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis

# ANNEX A

(*Clause* 3.4)

## SCHEDULE FOR COMPOUNDING AND TESTING FOR PHYSICAL EVALUATION OF CARBON BLACK

### A-1 GENERAL

These procedures involve the incorporation of the black to be tested in rubber along with the necessary auxiliary agents, to permit vulcanization, followed by testing along with each test black, a corresponding stock containing the Industry Reference Black No. 6 is included. The difference between the properties obtained on the reference black is simply a device to cancel the inevitable variations in test results which are due to minor variations between laboratories in equipment, materials, procedures and ambient conditions.

### A-2 STANDARD FORMULA

The standard formula for testing carbon black is given below:

| *Material* | *Parts by Mass* |
|---|---|
| Natural rubber (grade ISNR 5) (conforming to IS 4588 : 1986) | 100 |
| Zinc oxide (conforming to IS 3399 : 1973) | 5 |
| Stearic acid (conforming to IS 1675 : 1971) | 3 |
| Benzothiazyl disulphide (conforming to IS 8483 : 1989) | 0.6 |
| Sulphur (conforming to IS 8851 : 1978) | 2.5 |
| Carbon black (FEF) | 50 |

## A-3 MIXING METHOD

**A-3.1** The mixing method is given in **A-3.1.1** to **A-3.1.10.**

**A-3.1.1** Use a two roll laboratory mill having 150 mm outside diameter and 250 to 280 mm working distance between the guides The roll speed ratio should be 1 to 1.4 Adjust and maintain roll temperature at 70 ± 5°C and set mill opening at 1 4 mm

**A-3.1.2** The carbon black shall be conditioned before weighing, by heating in an oven at 100 to 110°C for 1 h

**A-3.1.3** Weigh the ingredients for a batch size which is 4 times of the parts by mass as given in **A-2.**

**A-3.1.4** Add rubber on mill and band (time 2 0 minutes)

**A-3.1 5** Add stearic acid and 3/4th cut once each way (time 2 5 minutes)

**A-3.1 6** Set mill opening 1 65 mm Add zinc oxide, sulphur and accelerator and 3/4th cut twice each way (time 2 minutes)

**A-3 1.7** Add carbon black Open mill gradually to maintain constant bank 3/4th cut three times each way after all carbon black is incorporated (time 7 5 minute) Add carbon from the mill pan until all the black is incorporated

**A-3.1.8** Cut stock, roll and weigh If the mass is beyond the tolerance of ± 0 5 percent, reject the batch (time 1 minute)

**A-3.1.9** Pass end-wise six times at 0 8 mm opening, and sheet off at 2 2 mm finished gauge (time 2 5 minutes)

**A-3.1.10** Condition the stock for 1 to 24 hours at a temperature of 27 ± 2°C and cut out suitable slabs for vulcanization.

## A-4 VULCANIZATION

**A-4.1** The test pieces are vulcanized for 15 to 30 minutes at 145°C in a standard 4 cavity mould which gives sheets of dimensions 150 × 150 × 2 mm The curing press shall be capable of exerting a minimum pressure of 3.5 $MN/m^2$ (approx 35 $kg/cm^2$) on the cavity areas of the mould during vulcanization After vulcanization, the sheets shall be cooled immediately in water Condition the vulcanized test slab for 16 hours at 27 ± 2°C before testing

## A-5 TESTING

The vulcanized sheets are tested for 300 percent modulus, and tensile strength in accordance with IS 3400 (Part 1) 1987

## A-6 PHYSICAL PROPERTIES

The difference in physical properties of vulcanizates containing FEF carbon black as compared to IRB No 6 shall be as given in Table 2

**Table 2 Difference in Physical Properties of Vulcanizates Containing FEF Carbon Black as Compared to IRB No. 6**

| Cure Conditions | Tensile Strength, Min | 300 Percent Modulus |
|---|---|---|
| (1) | (2) $MN/m^2$ | (3) $MN/m^2$* |
| 15 min at 145°C | −4 2 | +0 2 to +3 2 |
| 30 min at 145°C | −4 2 | +0 2 to +3 2 |

* 1 $MN/m^2$ = 10 2 $kgf/cm^2$ approx

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This Indian Standard has been developed from Doc No PCD 13 ( 1280 ).

**Amendments Issued Since Publication**

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